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Christina Felfe

**The Willingness to Pay for Job Amenities:  
Evidence from Mothers' Return to Work**

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German Socio-Economic Panel Study (SOEP)  
DIW Berlin  
Mohrenstrasse 58  
10117 Berlin, Germany

Contact: Uta Rahmann | [urahmann@diw.de](mailto:urahmann@diw.de)

# **The Willingness to Pay for Job Amenities: Evidence from Mothers' Return to Work\***

Christina Felfe  
University St. Gallen  
November 2009

## **Abstract**

*This study is the first to estimate mothers' marginal willingness to pay (MWP) for job amenities directly. Its identification strategy relies on German maternity leave length. The key aspect of the maternal leave framework is that mothers can decide whether and when to return to their guaranteed job. Thus, in contrast to previous studies that analyze the job search of employed workers, this framework allows us to overcome the limitation of not observing the wage/amenity offer process. A theoretical model of the leave length decision is derived from a random utility approach. Using data from the German Socio-Economic Panel and the Qualification and Career Survey, this model is estimated by a discrete duration method. The MWP for amenities can be inferred through the estimated elasticities of the leave length with respect to the amenities and the wage. The results provide evidence that mothers are willing to sacrifice a significant fraction of their wage to reduce hazards (20%) and to enjoy a flexible working schedule (44-56%).*

**JEL-Code:** J31; J33; J22

**Keywords:** Marginal Willingness to Pay; Maternal Labor Supply; Discrete Duration Models

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# 1. Introduction

Almost 40% of mothers in the OECD are currently not participating in the labor force.<sup>1</sup> Among women with small children (younger than 3 years old) this percentage is even higher; at this time, 47% of them are inactive. Conversely, labor force participation among childless women is similar to that of men (73% versus 75%, respectively). Given that career interruptions lead to human capital depreciation and hence, to a loss in long-term income and career opportunities, it is crucial to understand the incentives that mothers face when deciding whether and when to return to work after childbirth. So far, however, we lack any direct measure of the extent to which mothers' work decision is triggered by certain job features.<sup>2</sup> Therefore, this study provides a first estimate for mothers' marginal willingness to pay (MWP hereafter) for certain job-related amenities.

Estimating the MWP for amenities is a complex endeavor and earlier research has failed to provide conclusive evidence.<sup>3</sup> Gronberg and Reed (1994), for instance, focus on the job search of employed male workers. However, because of the unobservability of potential job offers, the authors are limited to estimating the impact of current job features on job tenure and fall short of separating these effects from those of the wage and amenities of latent job offers. Bonhomme and Jolivet (forthcoming) address this limitation by explicitly modeling the wage/amenity offer process. They show that despite weak compensating wage differentials, there is a systematic and significant MWP for job-related amenities.

The present study suggests an alternative framework for the estimation of mothers' MWP for amenities. Its identification strategy relies on German statutory maternity leave and

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<sup>1</sup> All numbers on mothers' labor force participation are taken from [www.oecd.org/els/social/family/database](http://www.oecd.org/els/social/family/database).

<sup>2</sup> There is some evidence that unfavorable working conditions (such as hazards, inflexible schedules, etc.) might be important deterrents to returning to work (Bratti et al., 2004; De Leire and Levy, 2004; Felfe, 2008).

<sup>3</sup> Note, there is a long literature on compensating wage differentials dating back to Rosen (1976). Since then empirical research has tried to estimate the compensation paid for disamenities using so-called hedonic wage regressions (among others Lucas, 1977; Brown, 1981; Duncan and Holmlund, 1983). Nevertheless, Hwang et al. (1998), prove theoretically that estimates from hedonic wage regressions are biased as they fail to consider the dynamic nature of the labor market. Gronberg and Reed (1994) are the first to address this issue. Notice, they estimate the price that workers' are willing to pay for amenities and not the compensating differentials determined by the market. The present study draws heavily upon their suggested strategy.

thus on the time mothers decide to spend out of the labor force. The key proposition is that maternity leave will be shorter if a mother's job, which is guaranteed while being on leave, offers more attractive characteristics such as higher wages and more amenities. Given this proposition, the MWP can be derived by dividing the elasticity of maternity leave length with respect to a certain amenity by the elasticity with respect to the wage.

For the purpose of identification, the advantage of using Germany is its generous parental leave system; since 1992, German working mothers are entitled to a leave of 36 months.<sup>4</sup> During this period, mothers enjoy a job guarantee and, hence, are free to decide whether and when to return to their jobs. The remarkable length of this period allows for sufficient variation in the chosen duration of maternal leave. More importantly, the fact that jobs are guaranteed for the whole period enables observation of all the relevant features of the options mothers face while on leave: staying at home or returning to their guaranteed job during their legally granted leave period of 36 months. One may argue that since mothers may search for a new job while being on leave, I may likewise fail to observe possible external job offers. The data shows, however, that mothers rarely change jobs during maternal leave (only 2%). The job guarantee during the maternal leave period is thus the key element in this strategy to estimate the MWP.

My results, obtained from a discrete duration model using data from the German Socio-Economic Panel and the Qualification and Career Survey, reveal that mothers are willing to sacrifice a significant fraction of their wage to reduce hazardous working conditions (almost 20% for a reduction of one standard deviation) and to enjoy a working schedule compatible with available daycare (44-55%). Stratification according to mothers' and their partners' education, total household income and geographical location reveal the following pattern: mothers with high intellectual and financial endowments show a more pronounced disposition

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<sup>4</sup> Germany, Austria, Finland and France provide the most generous parental leave systems in the OECD. The US, in contrast, entitles recent mothers only to a leave of 12 weeks. For a comparison see: <http://unstats.un.org/unsd/demographic/products/indwm>

to trade wages for better working conditions; mothers in West Germany, where public childcare is particularly rare, are willing to accept higher trade-offs between wages and flexible working schedules.<sup>5</sup>

This study contributes to the literature as follows. First, it provides unprecedented insight into the price mothers are willing to pay to enjoy certain amenities. Moreover, given the proposed framework of maternity leave, we can overcome the limitations of previous studies to observe all relevant alternatives faced by the worker, and hence can provide an accurate measure of mothers' MWP for amenities. Given one major challenge many industrialized countries are currently facing, namely the decline of the workforce relative to the total population, understanding mothers' preferences with respect to certain job characteristics is crucial as it may allow us to activate some unused work potential.

The remainder of the paper is structured as follows. Section 2 provides a brief introduction to German leave legislation. The theoretical and empirical model is developed in Section 3. Section 4 describes the data, Section 5 reports the estimation results and Section 6 concludes with suggestions for an efficient policy design aimed at improving mothers' situation in the labor market.

## **2. Parental Leave Legislation**

Germany is one of the OECD countries with the most generous parental leave system. It consists of three parts: maternity protection, protected parental leave and parental benefits.

The first, maternity protection, regulated by the maternity protection law (1979), refers to a period of six weeks before and eight weeks after birth during which mothers must not work.<sup>6</sup> The second, protected parental leave, allows the mother to choose between staying on

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<sup>5</sup> Notice, private childcare facilities are not common in Germany. Due to high regulation and a lack of public subsidies, it is not profitable to run a private childcare institution.

<sup>6</sup> During this period, the mother receives her net wage rate. The social security pays 13€ per day, while the employer has to cover the remaining amount.

leave and returning to work during a certain period after giving birth.<sup>7</sup> Since the parental leave is the true period during which a mother is free to decide about her participation in the labor market, the present study focuses on this period.

The Federal Law of Parental Leave and Parental Benefit was introduced in 1986. It allows a woman to take some extra months off beyond the maternity protection period, while keeping the option to return to her former job; i.e. the employer has to guarantee her a position comparable to her former one. The parental leave has been subsequently extended from a length of 10 months at the time of its introduction in 1986 to a length of 36 months since 1992. A mother is eligible for parental leave if she has worked at least six months in the same job before childbirth. It is important to stress that the mother has to inform her employer as well as the social security in advance about her leave plans, in particular six weeks prior to childbirth. In other words, the decision about leave length has to be taken prior to childbirth and hence is based entirely on pre-leave criteria.

This law also regulates the maternity benefits, the third pillar of the maternity leave legislation. The government pays the benefit conditional on the mother taking care of her child; in other words, it is paid as long as the mother remains on leave.<sup>8</sup> Until 1992 this benefit was provided for the whole leave period, but since 1992 for at most 24 months of the total parental leave period. While before 1994 the parental benefit was independent from household income, afterwards it became income dependent.<sup>9</sup> There are two income thresholds, one affects the payment of the benefit in months 1-6 and the other applies to months 7-24.<sup>10</sup> An income higher than the respective threshold incurs a complete loss of the benefit during the first six months, but only a gradual reduction of the benefit after month six.

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<sup>7</sup> Even if both parents are eligible for parental leave, in practice less than 5% of the fathers are taking leave.

<sup>8</sup> A mother is allowed to work at most 19h/week (from 2001 on: 30h/week) to receive the benefit.

<sup>9</sup> The amount of the benefits is calculated taking into account the household income in the year previous to childbirth and hence is based on pre-birth conditions. Note, it is not linked to previous maternal wages, but only depends on the remaining household income, such as husband's labor earnings, income from capital assets, etc.

<sup>10</sup> The total income during the first six months (months 7-24) after birth cannot exceed 51000€ (20500€) for a two parent household and 38000€ (16500€) for a single parent household.

Since 2001 a mother has the choice between two different benefit versions; either she receives a benefit of up to 300€ for 24 months or a higher benefit of up to 450€ for only 12 months.

Previous studies have shown that the leave legislation, especially the total leave length, affects mothers' work decisions.<sup>11</sup> Therefore, in the following analysis I consider only the years from 1992 until 2006, during which the parental leave has gone unchanged.

The subsequent section introduces the random utility model which underlies the estimation of mothers' leave length decision.

### **3. A Model of Parental Leave Length**

#### **3.1. The Basic Model**

The following model captures the relevant considerations of a mother when deciding about the length of parental leave. This decision is implicitly assumed to be the result of rational decision-making, in the sense that choice is influenced by the expected costs and benefits of the available alternatives. The objective is to reveal the impact of the wage and amenities of the guaranteed job on the chosen leave duration. As pointed out above, it is crucial to be aware of the fact that the decision about the leave length has to be taken prior to childbirth and hence, is entirely based on the information available prior to childbirth.<sup>12</sup>

At any month during maternity leave a mother has the choice between staying on leave or returning to work. In case she stays on leave, she derives utility from her own consumption and from being on leave directly; in case she returns to work, she derives as before utility from her own consumption, but as well from the amenities implied by her guaranteed job. A mother expects to face a budget constraint that, in addition to other sources

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<sup>11</sup> see Ondrich, Spiess, Yang and Wagner (2003); Schönberg and Ludsteck (2006).

<sup>12</sup> I want to emphasize again that not only the decision about maternity leave length has to be taken prior to childbirth, which is due to the obligation of a mother to inform both her employer as well as social security about her intended leave length prior to childbirth, but also the benefit is calculated considering the financial situation of the family in the year prior to childbirth. Despite the legal enforcement, there might be mothers who negotiate with their employer and hence deviate from the declared leave length. Unfortunately, we do not possess of any information about the leave declaration nor about possible agreements between mothers and employers and hence cannot take these cases into consideration.



of income such as her husband's income, capital income and so forth, is determined by her own wage, if she returns to work, and by the maternity benefit, if she is on leave. Thus, the alternative utilities of a mother  $i$  for every single month  $t$  of the leave period, before making any assumptions about functional forms, look as follows:

$$U_{it} = \begin{cases} U_{it}^{\text{Leave}} = U(C_{it}; t; X_i; \alpha_i^L; \varepsilon_{it}) & \text{if the mother is on leave} \\ U_i^{\text{Return to work}} = U(C_{i0}; A_{i0}; X_i; \alpha_i^W) & \text{if the mother returns to work} \end{cases} \quad (1)$$

$$\text{s.t. } C_{it} = \begin{cases} C_{it} = I_{i0} + B(I_{i0}; t; \text{yr}) & \text{if the mother is on leave} \\ C_{i0} = I_{i0} + W_{i0} & \text{if the mother returns to work} \end{cases} \quad (2)^{13}$$

Let me first discuss the determinants of a mother's utility if she is on leave. First, a mother derives utility from her own consumption, indicated by  $C_{it}$ . In case she is on leave, her level of consumption is determined by the maternal benefit  $B(I_{i0}; \text{yr}; t)$  as well as all other sources of household income  $I_{i0}$ . Notice, the available income sources are considered at period 0, as the decision about maternity leave length has to be taken before childbirth and hence only information prior to childbirth is taken into account. The benefit, as explained in Section 2, is a function of other sources of income assessed prior to childbirth ( $I_{i0}$ ), the year in which the baby is born ( $\text{yr}$ ), and the number of months woman  $i$  has already been on leave ( $t$ ). Second, as mentioned above a mother also obtains utility from being on leave directly, modeled by the direct dependence of the utility on the months a mother has been already on leave. Moreover, I assume the utility from being on leave to change over time, in particular to decrease over time. The underlying idea is that a mother's time spent at home might be worth less over time, e.g. due to home productivity decreasing with the age of the child. Third, a mother's personal and professional characteristics, denoted by  $X_i$ , influence her utility. Last, I

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<sup>13</sup> Note that I assume no savings. Furthermore, I abstain from costs of a daycare place, as there is almost no daycare (for children under the age of 3) available in Germany.

incorporate individual heterogeneity with respect to the utility derived from having a baby in general, denoted by  $\alpha_i^L$ , and in the different months after giving birth, indicated by  $\varepsilon_{it}^L$ .

If a mother returns to work, her utility is determined by her level of consumption  $C_{i0}$ , her personal and professional characteristics  $X_i$ , but also by the amenities  $A_{i0}$  implied by her guaranteed job. The index 0 of the amenities refers to the period previous to birth and indicates that due to the job guarantee a mother faces after maternity leave the same amenities as before. Likewise, she will receive the same wage  $W_{i0}$  as before maternity leave. Hence, the level of consumption she experiences when returning to work, which in this case is determined by her wage  $W_{i0}$  and all other sources of income  $I_{i0}$ , is predetermined and the same at any of the 36 months of maternity leave. Finally, I consider individual heterogeneity with respect to the utility a woman derives from returning to work, which is assumed to be constant over time.<sup>14</sup>

Taken together, the above stated problem describes the following utility maximization problem: conditional on being eligible for maternity leave and given her budget constraint, a mother decides on the duration of her leave in order to maximize the discounted sum of utilities over the 36 month period.<sup>15</sup> Due to the job guarantee, the utility from returning to work is constant over the total leave period; i.e. since a mother has the right to return to her former job with the same wage and the same amenities during 36 months, she will face the same utility irrespective of the timing of her return.<sup>16</sup> The utility gained from remaining on

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<sup>14</sup> Given the job guarantee, a mother has the right to work after maternity leave in the same job as before, hence she faces the same observable conditions. Additionally, I assume that at the moment of deciding about her leave length she expects to have the same perceived utility from returning to work at any of the 36 months of the leave period, thus there is no time varying error component. Nevertheless, in Section 5.2. we allow the MWP to vary over time which shall account for the fact that despite the job guarantee conditions at the work place might vary over time and a mother might take this possibility into consideration when deciding about leave length.

<sup>15</sup> The discount factor is for simplicity reasons assumed to be equal to one. Notice furthermore, after the 36<sup>th</sup> month, the job guarantee no longer exists, so a mother would have to start searching for a new job if she would like to participate in the labor market again. Therefore, the model considers only the 36 months of the total leave period during which a mother enjoys a job guarantee.

<sup>16</sup> Obviously, over a 36 month period of not working, a woman is likely to experience a depreciation in human capital and may miss promotion opportunities. Thus, women in fields with high human capital depreciation and/or promotion opportunities will tend to return to work faster. In order to capture the severity of those foregone opportunities, I additionally control for the average wage growth of mothers' occupational category. See Section 3.2 for more details.

leave, on the contrary, is dependent on time and in particular decreasing over time. This is due to the declining benefit payment and the decreasing utility of staying at home over time. Thus, once the utility of being on leave is lower than that of returning to work at a given month  $t$ , it remains lower for the rest of the leave period.

The decision to return to work is thus a once-and-for-all decision; i.e., as soon as the utility of returning to work is greater than the utility of being on leave, a mother returns to work and stays until the end of the total leave period. The probability that a mother  $i$  starts working in month  $t$ , is thus as follows:

$$\begin{aligned}
& \text{Prob}(\text{Return to work}_{it}=1) \\
&= \text{Prob}(U_i^{\text{Return to work}} > U_{it}^{\text{Leave}}) \\
&= \text{Prob}(U(I_{i0}+W_{i0}; A_{i0}; X_i; \alpha_i^W) > U(I_{i0}+B(I_{i0};t;yr); t; X_i; \alpha_i^L; \varepsilon_{it})) \tag{3}
\end{aligned}$$

This expression allows for predictions regarding the effect of the variables of interest: the higher the wage a mother is sacrificing while not working, the higher the opportunity costs of being on leave and thus the shorter the leave.<sup>17</sup> Assuming that amenities enter the utility function positively, a mother rather returns to work early when she enjoys certain amenities.

Our final objective is to estimate mothers' MWP for certain amenities. Following the approach by Gronberg and Reed (1994), we can use the elasticities of the probabilities to return to work with respect to the wage and to a certain amenity to derive the MWP:

$$MWP = \frac{\frac{\partial W_{io}}{\partial A_{io}}}{\frac{\frac{\partial \text{Prob}(\text{Return to work}_{it})}{\partial A_{io}}}{\frac{\partial \text{Prob}(\text{Return to work}_{it})}{\partial W_{io}}}} \tag{4}$$

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<sup>17</sup> Besides the substitution effect of mother's wage on the elasticity of the leave duration, which is considered by the model, there may be furthermore an income effect. If maternity leave is a normal good, then higher wage mothers will experience a positive income effect and hence stay longer at home. While this income effect is unlikely to swamp the substitution effect, it will lead to smaller wage estimates. As we can see in equation (4), the wage coefficient enters the calculation of the MWP in the denominator, and thus, the here provided MWP may provide only a lower bound.

From here it is straightforward, using the derivatives of the probability to return to work with respect to the wage and amenities, to calculate the MWP for a certain amenity:

$$MWP = \frac{U_A}{U_c} \quad (5)$$

We can see that the MWP is determined by the marginal utility of consumption  $U_C$  and the marginal utility of the amenity  $U_A$ . The MWP is inversely related to the marginal utility of consumption; i.e., the higher the marginal increase in utility due to more consumption, the less wage a mother is willing to sacrifice for an amenity. The opposite is true for amenities; i.e., the higher the marginal utility of an amenity, the more wage a mother would give up in order to enjoy this amenity.

This model is of course simplistic and ignores the possibility that mothers might search for a new job while being on leave. However, as the data demonstrate, this assumption is far from being unrealistic; mothers see their job guarantee as a kind of insurance and thus rarely change jobs during their maternity leave (only 2%). This assumption of no job searching is the key stone of the model, which thus offers a framework that allows for an economic interpretation of the parameters and for an accurate derivation of mothers' MWP.

### 3.2. Implementation

In order to estimate the model, we need to make some assumptions about the functional form of the utility and the distribution of the residuals. For simplicity, I assume a linear individual utility function, so that equation (1) combined with equation (2) becomes:

$$U_{it} = \begin{cases} U_{it}^{\text{Leave}} = \beta^L(I_{i0} + B(I_{i0}; t; yr)) + \gamma_0(1 - \gamma_1 t) + \eta^L X_i + \alpha_i^L + \varepsilon_{it} & \text{if the mother is on leave} \\ U_i^{\text{Return to work}} = \beta^W(I_{i0} + W_{i0}) + \delta A_{i0} + \eta^W X_i + \alpha_i^W & \text{if the mother returns to work} \end{cases} \quad (6)$$

where, as before, the utility derived from being on leave is determined by consumption, in this case constituted by the benefit  $B(I_{i0}; t; yr)$  and other income sources  $I_{i0}$ , by the time spent at home directly, by personal and professional characteristics  $X_i$  and by a time

invariant and a time varying error component, denoted by  $\alpha_i^L$  and  $\varepsilon_{it}$  respectively. The utility derived from returning to work is likewise determined by consumption, now determined by mother's guaranteed wage  $W_{i0}$  and other income sources  $I_{i0}$ , as well as her individual observed and unobserved characteristics,  $X_i$  and  $\alpha_i^W$  respectively. Additionally, her utility depends on the amenities she faces when returning to her guaranteed job, denoted by  $A_{i0}$ . In the following I describe briefly how the different determinants are included in the estimation procedure.

As already mentioned consumption is determined by the total income of a household which consists of the mother's wage  $W_{i0}$ , in case she is back to work, the maternal benefit, in case she is on leave, and other sources of income  $I_{i0}$ . In order to capture the determinants of the maternal benefit  $B(I_{i0};t;yr)$ , I include additionally a set of year and month dummies. Both consumption coefficients  $\beta^L$  and  $\beta^W$  are expected to be positive since a higher disposable income is assumed to increase utility. The effect of being on leave on utility is assumed to be not only direct but also to change over time, which is captured by a decomposition of the leave coefficient: one general coefficient,  $\gamma_0$ , and another one,  $\gamma_1$ , which interacts with the leave length  $t$ . In this way, I allow the utility of being on leave to decrease over time. This effect is controlled for by a set of month dummies. As personal characteristics I consider mother's age, partnership, education, region and the number of children; professional properties are proxied by the sector in which the woman works as well as the average occupational wage growth. The two latter variables are assumed to capture opportunity costs of not working, such as missed promotion opportunities or depreciation in human capital. Allowing the coefficient  $\eta$  to depend on mother's working status reflects the possibility that professional and personal features might influence the utility differently, depending on if a mother is on leave or returns to work. The main interest lies in the impact of amenities on utility which a mother is exposed to as soon as she returns to her guaranteed job. Thus, a great variety of amenities  $A_{i0}$  is included in the regression (see Section 4.2 for details). The

coefficient  $\delta$  is expected to be positive, indicating an increasing effect of an amenity on utility.

Under the linear specification of the utility function outlined in equation (6) and the additional assumption that  $\varepsilon_{it}$  follows a logistic distribution, the probability of returning work in month  $t$ , equals:<sup>18</sup>

$$\begin{aligned}
& \text{Prob (Return to work}_{it}=1) \\
&= \text{Prob (} U_i^{\text{Return to work}} > U_{it}^{\text{Leave}} \text{)} \\
&= \text{Prob (} \beta^W W_{i0} + \delta A_{i0} - \beta^L (I_{i0}; yr; t) - \gamma_0 (1 - \gamma_1 t) + (\beta^W - \beta^L) I_{i0} + (\eta^W - \eta^L) X_i + (\alpha_i^W - \alpha_i^L) - \varepsilon_{it} > 0 \text{)} \\
&= \frac{e^{\beta^W W_{i0} + \delta A_{i0} - \beta^L (I_{i0}; yr; t) - \gamma_0 (1 - \gamma_1 t) + \beta I_{i0} + \eta X_i + \alpha_i}}{1 + e^{\beta^W W_{i0} + \delta A_{i0} - \beta^L (I_{i0}; yr; t) - \gamma_0 (1 - \gamma_1 t) + \beta I_{i0} + \eta X_i + \alpha_i}} \quad (7)
\end{aligned}$$

where  $\beta$ ,  $\eta$  and  $\alpha_i$  summarize  $(\beta^W - \beta^L)$ ,  $(\eta^W - \eta^L)$  and  $(\alpha_i^W - \alpha_i^L)$ , respectively. The decision about the leave length can be estimated by a discrete logistic duration model; the likelihood function includes all months a mother stays on leave, modeled by  $(1 - \text{Prob}(\text{Return to work}_{it}))$ , and the month when she returns to work, expressed by  $\text{Prob}(\text{Return to work}_{it})$ . The estimation of the coefficients is, however, complicated by the fact that mothers might differ systematically in their unobserved characteristics, represented by  $\alpha_i$ , even though they are observationally identically. Since the composition of the sample of mothers who stay on leave changes as time proceeds, with respect to both, observed and unobserved characteristics, ignoring this unobserved heterogeneity can lead to inconsistent estimators. Hence, I estimate the leave decision using a discrete logistic duration model and allow for unobserved heterogeneity introducing a log-normally distributed time-invariant individual component  $\alpha_i$ .<sup>19</sup>

<sup>18</sup> The results are robust to different assumptions about the error distributions and are available upon request.

<sup>19</sup> I estimate the model assuming different functional forms for the unobserved heterogeneity (e.g. gamma distribution, discrete mass points). The results however do not alter significantly and are available upon request. One alternative estimation method would be to take advantage of multiple spell data which allows the elimination of individual permanent unobserved characteristics. There are however two concerns which speak against the use of multiple spell data in this context. first, as mentioned, multiple spell data only allows us to get hold of individual permanent differences, time varying differences are, however, not controlled for. Second, in

Using equation (5) and the outlined assumptions the MWP looks as follows:

$$MWP = \frac{\partial W_{io}}{\partial A_{io}} = \frac{\frac{\partial \text{Prob}(\text{Return to work}_{it})}{\partial A_{io}}}{\frac{\partial \text{Prob}(\text{Return to work}_{it})}{\partial W_{io}}} = \frac{\delta}{\beta^w} \quad (8)$$

Given the positive coefficient of the wage and of the amenities, the MWP for an amenity should be positive. Thus, the model predicts that a mother is willing to sacrifice part of her wage to enjoy certain amenities.

Notice, the suggested estimation method only corrects for time invariant heterogeneity among mothers' which is independent of their individual observable characteristics. Issues like mothers' sorting into occupations according to their personal preferences might not be tackled with this random-effect type model.<sup>20</sup> So far, please bear in mind, that the estimated coefficients have to be interpreted as the causal effect of the characteristics of the guaranteed job on leave length plus the preference of a mother for a certain type of job.

The next section describes the datasets used and the construction of the amenities.

## 4. Data

### 4.1. The German Socio-Economic Panel and the Qualification and Career Survey

For the analysis of mothers' MWP for job-related amenities, two datasets are used: the German Socio-Economic Panel (GSOEP) and the Qualification and Career Survey (QCS). The GSOEP is an annually repeated survey of Germans and foreigners in East and West Germany, which has followed its members continuously since 1984.<sup>21</sup> This study uses waves 1992-2006 which correspond to the period during which the maternity leave period has remained unchanged. The QCS is a survey of employees carried out by the German Federal

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the context of maternity leave spells, women who are observed several times taking maternity leave are by definition multiple mothers, which are first rare and second a special type of mothers whose preferences cannot be generalized.

<sup>20</sup> This issue of occupational sorting will be discussed more in Section 5.3.

<sup>21</sup> For more information about the GSOEP please refer to Wagner, G. et al (2007).

Institute for Vocational Training (Bundesinstitut für Berufsbildung) and the Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung). There are four cross-sections launched in 1979, 1985/86, 1991/92, and 1998/99, each covering about 30,000 individuals. For this study, the latest cross-section is used since it lies within the time at which the sample of mothers takes parental leave and is the only cross-section that includes a 4-digit occupational code that allows a merging of the two datasets.<sup>22</sup>

The GSOEP and the QCS have several features that make them especially suitable for the proposed methodology to estimate mothers' MWP for amenities. The GSOEP has detailed annual information on personal as well as on some professional characteristics such as the individual's occupation, the wage and the working schedule. Furthermore, it provides monthly information on fertility as well as professional activities, such as working and being on maternity leave. This information allows me to construct maternity leave spells for each woman and to determine her occupation prior to childbirth. The QCS contains a great variety of occupational amenities, which complements the occupational information provided by the GSOEP. Details about the amenities contained in the QCS are given below.

The sample of interest includes all women who gave birth during 1992-2005 and were eligible for maternity leave.<sup>23</sup> As described in Section 2, eligibility for maternity leave is conditional on having worked for at least six months on the same job. According to the Federal Statistical Office, in 2003, 90% of West German women qualified for maternity leave, while not even 65% of East German mothers did so. In spite of being less eligible for maternity leave, East German women more often exercise their right to maternity leave: 95% of eligible women in East Germany take some leave, while in West Germany only 80% do so.

The data provided by the GSOEP suffer from two shortcomings: first, the monthly activity history is partly left censored, which complicates the derivation of mothers' eligibility

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<sup>22</sup> Alternatively I use the 3-digit occupational code, which is available for waves 1991/92 and 1998/99. The results using this alternative code barely differ and are available upon request.

<sup>23</sup> An important part of the information is reported retrospectively; thus, not all necessary information can be recovered for the last available wave 2006.



for maternity leave. Relaxing the eligibility condition and treating every woman as eligible who is observed in an employment contract for at least one month before giving birth, 85% of West and 65% of East German women in the sample qualified for maternity leave in 2003.

The second problem in the data is that activities are often simultaneously and sometimes incorrectly reported. If declaring several parallel activities I give preference to being on leave. According to the maternity protection law, women are not allowed to work in the first eight weeks after giving birth. However, more than 5% of the women reported working during the maternity protection period. Since these spells are certainly mis-reported, I exclude all leave spells that are shorter than two months.

The final sample includes 1404 leave spells (28,587 individual-month observations).<sup>24</sup> 607 women returned to their job, out of which 31 continued working immediately after the protection period. 208 women were on leave for the whole parental leave period and did not exercise their right to return to work during the first three years after birth. The remaining 589 spells are right censored, thus we do not know whether and when they returned to work. That said, we observe high panel attrition, an issue which is further discussed in Section 5.3.

## 4.2. Amenities

As mentioned above, the GSOEP contains information on individual wages and personal working schedules, in particular working hours (including overtime), frequency of working in the evening (6-9pm), during the night (9pm-6am) and in rotating shifts. The QCS provides information on additional, more specific job features that are not provided by the GSOEP:<sup>25</sup> physical demand of the job, lifting heavy weights (>20 kg), lying down or

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<sup>24</sup> These spells include leave spells following the first until the fifth birth. In case a woman reported being on leave several times, I treat this as a separate spell, while controlling for the order of birth. In Section 5.3., I estimate a competing risk model of only first birth spells.

<sup>25</sup> The GSOEP contains some information about broadly defined amenity categories. Hence, one alternative to average occupational conditions is to rely on these individually reported conditions, which have the advantage to vary on the individual level and to correspond exactly to the conditions perceived by the mother. For my objective, however, these categories are too general and furthermore too noisy. Average occupational conditions have the advantage to be an objective measure for the work conditions. Given that our matching procedure relies on the 4-digit occupational code, which comprises more than 800 occupations, they should represent the individual situation of the mother quite well.

kneeling, standing during most of the shift, if the job is tiring for the eyes, if the job exposes the worker to dust or smoke, to a dirty working environment, to extreme climate conditions, to noise and to risks of injury. These amenities, actually in this case rather disamenities, can be matched with the sample of women on maternity leave via the 4-digit occupational code of the Federal Statistical Institute, which is contained in both datasets. Thus, the final sample contains information about the occupation in which a woman worked prior to giving birth, the individual wage, the personal working schedule, and the average occupational aspects of workload and hazards.

In order to create representative average occupational characteristics, I restrict the 1998/99 wave of the QCS to women in their child-bearing ages (16-46 years), like the ones in the sample of interest. These women are engaged in 772 different occupations. For each occupation I calculate the mean of every amenity. In the original QCS questionnaire, the women are asked if they are never, rarely, sometimes, often or always exposed to the respective condition, which is coded into discrete values of 0 to 4. However, averaging these discrete values for different occupations produces values that are close to being continuous on a scale from 0 to 4. For interpretational convenience, I rescale the average occupational characteristics from 0 to 100: the occupation with the highest level of a certain condition takes the value 100 and the lowest level takes 0.<sup>26</sup>

The above described occupational characteristics are very detailed and specific. For the purpose of significance and plausible interpretation, I create two indices (unweighted averages), summarized as “workload” and “hazards”, according to the distinction made in the literature on compensating wage differentials.<sup>27</sup> The following characteristics are included in

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<sup>26</sup> For every amenity we observe both the highest (100) and the lowest (0). An example might illustrate this ranking: workers in the plastic industry are the ones most exposed to risks of injury and death (they all report the value 4); while secretaries are least threatened by these dangers (they all report the value 0). Thus, the plastic industry gets the average value of 100 for risks of injury, while secretaries get 0. All other occupations are ranked in between.

<sup>27</sup> For the construction of the unweighted averages I follow Rosen (1986) or Villanueva (2007). Alternatively, I employ factor analysis. Estimation results using the resulting factors barely differ from our results and are available upon request.

each of the two indices: “workload” contains having a physically demanding job, lifting heavy weights ( $>20$  kg), lying down or kneeling, standing all the time and having a job that is tiring for the eyes; while “hazards” incorporate being exposed to dust or smoke, dirt or oil, extreme climate conditions, noise and risks of injury. The respective amenities within the two groups are sufficiently correlated among each other and hence represent reliable measures for the aspects of workload and hazards.<sup>28</sup>

To summarize, the sample contains women eligible for maternity leave, their individual wages, their personal working schedule (both taken from the GSOEP) and indices for average occupational workload and hazards (both constructed using the QCS). In the subsequent section, I present some descriptive statistics of the sample, the estimation results and several robustness checks.

## 5. Estimation Results

### 5.1. Variables and Summary Statistics

The first step of the analysis of mothers' MWP for amenities is to estimate the model of mothers' decision about maternity leave length. The determinants of interest are wages  $W_{i0}$  and amenities  $A_{i0}$ . These characteristics belong to the job a mother holds before going on maternity leave and to which she can return given the job guarantee during the whole leave period. An overview can be found in Table 1. For illustrative purposes, Table 2a provides a list of the top ten jobs, ranked in a descending order according to their level of hazards and workload. Additionally, Table 2b introduces the most common occupations among recent mothers and displays the respective mean of the different job characteristics.

The pecuniary aspect of the job is included in the estimation as the natural logarithm of the real gross wage rate. The average monthly gross income is 1600€ (the natural logarithm of the real gross wage is 2.3). The non-pecuniary characteristics are grouped into the

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<sup>28</sup> The Cronbach's alpha is 0.73 for workload and 0.81 for hazards.

following three aspects: the working schedule, workload and hazards. With respect to the working schedule we observe the following: Women work on average 35 hours, which includes on average 2 hours overtime. Quite a few mothers work in the evening (21%), at night (9%) and in rotating shifts (14%). With respect to average occupational workload and hazards the ranking shown in Table 2a tells us the following: The industry that demands the highest workload and the highest level of hazards is the plastic industry. Mothers, however, work mostly in occupations that expose them to slightly better conditions ( Table 2b). The most common occupation among mothers, nursing, exposes their workers to only 10.6% of the hazards and 64.0% of the workload involved in the plastic industry. Notice, while the level of hazards nurses are exposed to, corresponds to the average level of hazards (10.6) involved in mothers' occupations, the physical effort nurses have to exert lies above the average level (39.9). Further popular jobs among young mothers, such as banking and retail, offer even better conditions: the level of workload is 29.1 and 48.9, and of hazards 2.7 and 7.0, respectively.

The maternity leave decision is also influenced by institutions, such as the maternity benefit or the child care facilities. The benefit is proxied by the total household income  $I_{i0}$  and a set of year (1992-2005) and month dummies (36). The month dummies account furthermore for the fact that the utility of being on leave may decline with the age of the child. With the exception of East Germany, publicly available childcare for children under the age of 3 is very precarious in Germany; only 3% are actually covered by formal childcare. Hence, I control for this difference by including a dummy for East and West Germany.

As explained in Section 3, individual characteristics may play an important role for the leave decision. Table 3 gives an overview of the personal and household characteristics of the women in the sample. I control for age, partnership, education, income, the number of previous children, and last the sector in which the woman has been working.

Before describing the regression results, notice the length of maternity leave and its relation with each amenity. The Kaplan-Meier Survival estimates display a smooth pattern of maternity leave lengths (see Table 4); mothers are observed to return to their guaranteed job equally at any months of the maternity leave period. A first look at the relationship between leave length and wage, and leave length and amenities, without controlling for any other variables, already provides some useful insights (see Table 5). As expected, a higher wage is associated with a shorter maternity leave, while more hazards or workload with a longer leave. This is, however, only a first impression gained from the raw data. In the next section I present the results of the multivariate regression analysis which allow for more interpretation.

## 5.2. Results

As introduced in Section 3.2., I estimate the leave decision using a discrete duration model with a logistic hazard function and log-normally distributed random effects. Table 6 displays the resulting coefficients of the individual wage, the different aspects of the personal working schedule and the average occupational indices workload and hazards.<sup>29</sup>

Models 1 to 3 compare the estimation results, controlling first for no other variables except mothers' job characteristics, then including additionally personal characteristics (age, education, partner, region, total household income and birth order), and last average occupational wage growth as well as sector, month and year dummies. I also repeat the estimation under different assumptions for the functional form of the baseline hazard: including, instead of month dummies, either the logarithm or a polynomial of the time being on leave (model 4 and 5 respectively). The results barely change with the different specifications. Thus, the following discussion of the results focuses on the specification assumed in model 3, including the full set of control variables and using a non-parametric baseline hazard (month dummies).

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<sup>29</sup> The full set of estimated coefficients is available upon request.

The theory predicts that the higher the wage, and hence, the higher the opportunity costs of not working, the more likely a mother is to return to her job. The estimated coefficient of the ln of real gross wage confirms the prediction: women who have a job that pays 10% more wage per hour are 0.1% more likely to return to work in a given month (at the 1% significance level). The model, as introduced in Section 3, suggests furthermore a positive effect of amenities on the decision to return to work. The estimated coefficient of the hazards is in line with this prediction: women who have been working under bad working conditions tend to stay significantly (at the 5% level) longer on maternity leave: one standard deviation more of hazards (which corresponds to 10 units of hazards and, for example, to the difference in hazards a secretary or a nurse are exposed to) reduces the likelihood to return to work by 0.2%. Estimating the model using as controls each of the different aspects included in the index “hazards” separately shows that the deterring effect stems mainly from jobs exposing the women to dust, smoke and extreme climate conditions.<sup>30</sup> The actual effect of workload is insignificant. Nevertheless, looking at the separate effects of the different aspects of workload reveals that working in an uncomfortable position such as stooping, kneeling, etc., has a significantly negative effect on returning to work. The working schedule influences the decision of leave length as follows: mothers in jobs entailing on average ten hours more per week, are 0.1% less likely to work in a given month. Jobs requiring night work are also less attractive to mothers after childbirth (by 0.3%). However, both effects are not significant. In addition, women who have jobs that involve working in the evening or in rotating shifts are significantly (at the 5% level) more likely to work in a given month (by 0.6% and 0.7% respectively).

The effect of personal characteristics on the leave length decision are in line with the findings of previous studies;<sup>31</sup> women who are older and have a partner, several children and more financial resources are less likely to work soon after childbirth, while women who live

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<sup>30</sup> The estimation results including all job characteristics separately are available upon request.

<sup>31</sup> The full set of estimated coefficients is available upon request.

in East Germany and are highly educated tend to return to work earlier. Moreover, the estimated coefficients of the month dummies predict a decreasing utility from being on leave: while during the first twelve months mothers are 0.7-1.9% more likely to return to work than right after childbirth, this probability increases to 2.8-5.5% during the second year after childbirth and to even 2.2-9.3% during the third year after childbirth. Testing for the presence of individual time-invariant heterogeneity, such as ability or preferences, reveals moreover a significant impact of these individual unobserved characteristics on the maternity leave length decision (the estimated coefficient of the random effect is significant at a 1% significance level).

Given the elasticities of the hazard rate with respect to wages and the selection of amenities, it is now straightforward to derive how much mothers are willing to pay for these amenities (see Table 7). In line with the estimated coefficients shown above, mothers are only willing to sacrifice a significant percentage of their wage for a decrease of hazards and to overcome a rigid working schedule. For a less hazardous work, mothers are willing to give up a significant (at the 5% level) amount: in order to suffer one standard deviation less health risks, recent mothers are willing to sacrifice 19.9% of their wage. Furthermore, it may be more convenient for mothers to work in the evening or in rotating shifts, as these schedules may allow for an informal solution of childcare. Consequently, we can see that mothers are willing to sacrifice 44.2% of their wage to work in the evening and 54.7% for rotating shifts.

The estimates for mothers' MWP are surprisingly high. Thus, in order to provide some supports for my findings I pursue the follow approach. First, comparing my findings with the MWP for males found, for instance, by Gronberg and Reed (1994) and Bonhomme and Jolivet (forthcoming) and providing further outside evidence on the prevalence of certain job-related amenities among recent mothers allows me to put my findings in the context of the literature. Second, stratification according to individual or institutional characteristics sheds some light on the determinants which might trigger mothers' MWP. For this purpose, I

analyze the impact of wages and amenities on the chosen leave duration, distinguishing between mothers' regional, financial and educational background and last the leave length.

Let me first discuss the basic regression results with respect to occupational hazards which reveal a high disposition of mothers to pay significant amounts to avoid occupational hazards (19.9% for a reduction by one standard deviation). This estimate lies slightly above previous findings for the MWP of male workers. Gronberg and Reed (1994), for instance, find a MWP of 13.4% for US male workers; Bonhomme and Jolivet (forthcoming) confirm this magnitude for Austrian, Danish and Dutch workers (12.8-15.2%).<sup>32</sup> The slightly higher MWP for good working conditions among mothers is in line with findings of previous studies (DeLeire and Levy, 2004; Felfe, 2008) which attest a crowding of women, in particular of mothers, into safe jobs. Distinguishing between mothers with different financial and educational background, however, shows that not all women are willing or able to sacrifice significant parts of their wage to reduce unpleasant or unhealthy conditions. Table 8a provides the MWP to avoid hazards for mothers of different income and education groups. A clear pattern arises: the more financial resources, the more wage a mother is willing to give up to diminish these hazards (18%-25% for a reduction by one standard deviation); likewise the more education a woman has, the bigger the accepted trade-off between wage and hazardous conditions (0%-77%). Moreover, distinguishing between the education of a woman's partner confirms the trend associated with the intellectual background: the more educated a woman's partner, the more averse is a woman towards occupational hazards (-3%-60%).

The MWP for a non-standard working schedule among recent mothers might be unexpectedly high at first sight. Bonhomme and Jolivet (forthcoming), for instance, find a much lower MWP for a convenient working schedule among Dutch and Danish workers

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<sup>32</sup> Notice, Bonhomme and Jolivet (forthcoming) use a sample of 8 countries (Austria, Denmark, Spain, Finland, France, Italy, Netherlands and Portugal). For the purpose of comparison between their findings and my findings, it is reasonable to use only those countries which are similar to Germany in cultural aspects.



(15.2% and 22.0%, respectively).<sup>33</sup> Nevertheless, non-standard working schedules seem to be more widespread among parents. Presser (2005) elicits family reasons as the main predictor for non-standard working hours and puts forward the persistently higher prevalence of unorthodox working schedules among workers with children. Hence, in case a non-standard working schedule helps parents to arrange childcare informally, we should be able to observe an increase in the compatibility of parents' working schedules around child birth. In order to give some more substance to this supposition, I construct a measure indicating if the partners work according to complementary schedules and hence, if there is at least one person at home at any time of the day. Using a logit regression and controlling for demographic characteristics of the couple, such as age, education, region and having a child, shows that the presence of a child leads to increased complementarities of the working schedules, particularly in West Germany (15%).<sup>34</sup> Moreover, stratification according to partner's education reveals additionally that coordination of childcare seems to work the better the higher the intellectual background: the more educated their partner, the higher mothers' MWP to work according to an unorthodox working schedule, 0%-83% for a working schedule in the evening and 12%-98% for rotating shifts.<sup>35</sup>

Taken together, these results support the hypothesis that mothers appreciate a non-standard working schedule as it allows them to coordinate the childcare informally with their partner. Nevertheless, stratification of the estimation between East and West German women might help to investigate this hypothesis further. Remember, the coverage of childcare facilities for children under the age of three is very poor in West Germany, as only 3% of the children can be accommodated in formal daycare. In East Germany, however, public childcare is available for every third child. Hence, regressions that control for interactions between the variety of job features and a dummy for East Germany could help to shed some

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<sup>33</sup> Notice, however, French workers are willing to sacrifice 43.4% of their wage in order to work according to suitable working times.

<sup>34</sup> Results for this analysis are available upon request.

<sup>35</sup> Results for this analysis are available upon request.

light on the outlined hypothesis. As can clearly be seen in Table 8b, only West German women have the disposition to sacrifice significant (at the 5% level) amounts of their wage in order to adjust the working schedule to their family life; they are willing to accept a wage reduction of 1.3% to work one hour less, 53.7% to work in the evenings and 54.3% to enjoy rotating shifts. East German women, if anything, would have to receive a premium in order to work in the evenings (55.89% of their hourly wage, which however is not significant). These sharp differences between East and West Germany support the hypothesis that mothers' high MWP for non-standard working schedules can be traced back to family obligations.

Finally, the MWP for amenities might also vary with the time mothers stay out of the labor market. As mentioned above, this variation might not at last arise due to the fact that, despite the job guarantee, conditions at the workplace might change over time. However, comparing the amenities before and after the maternity leave of the women who actually return to work (see Table 9a), we can observe major changes only in working hours and the wage.<sup>36</sup> First, the drop in working hours per week can be explained by the high fraction of mothers coming back only to a part-time job. Since 2001, one has the right to reduce working hours as soon as the company has 15 employees or more. Including an interaction term between the reform and the size of the company as an additional control variable reveals that the right to work part-time has a positive, but not significant impact on the leave length decision. Second, as mentioned already above, over a period of 36 month a mother may miss promotion opportunities and is likely to experience a depreciation in human capital. Including occupational average wage growth as a control variable shall account for this possibility. Its coefficient is positive, indicating an earlier return to a job with more promotion possibilities, but insignificant. A mother might moreover integrate the wage depreciation into her decision about the leave length. Thus, the impact of the wage on the leave decision might vary over time and is not, as previously assumed, stable over the whole leave period. Using the results

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<sup>36</sup> Changes in workload and hazards are caused by changes in the reported occupational code.

from an estimation where additional interaction terms between the wage and dummies for all three years of the leave period are included reveals that the MWP to diminish hazards and to enjoy an unorthodox working schedule increases slightly, but not significantly over the years (see Table 9b).

### **5.3. Additional Specifications and Robustness Checks**

As already discussed in Section 3.2., modeling mothers' leave decision is complicated by the fact that mothers might differ systematically in their behavior, even though they are observationally identically. In the baseline estimation, presented in Section 5.2., I approached this problem by modeling the time invariant heterogeneity among mothers as a log-normally distributed random effect. The key assumption of this correction method is no correlation between the unobserved characteristics and the control variables. Mothers, however, might differ in their career aspirations and in their preferences for job conditions. These differences might cause mothers to sort into occupations which differ in the amount of amenities offered. In other words, job-related amenities and mothers' unobserved characteristics might actually be correlated and thus, our estimated coefficients might be biased. Nevertheless, the direction of this bias is not obvious. One could argue that women who are career-oriented return to work earlier, have a high preference for wage but not a strong preference for amenities. In this case, our estimated amenity coefficients would be biased towards zero, the estimated wage coefficient would be upward biased and the derived MWP for amenities would consequently provide a lower bound. However it may also hold true that women who try to combine career and family, i.e., want to have a child but also intend to work as soon as possible, sort into jobs that offer them a high level of amenities and thus allow for the compatibility of work and family. Should this actually be the case, the amenity coefficients and the above derived MWP would be overestimated.

One exercise to investigate if this presorting may bias the coefficients is to estimate the model using a subsample of women who cannot choose their job according to their

personal preferences. In the former German Democratic Republic, people could not freely choose their job, but were assigned an occupation after finishing their education.<sup>37</sup> Consequently, East German women who had a baby shortly after the reunification had the same right to maternity leave as West German women, but did not have the opportunity to choose a job according to their family plans. Thus, restricting the sample to the first three years after reunification, 1992-94, and estimating the baseline model with additional interaction terms for the wage and amenities and a dummy for East German women should help us to investigate if presorting causes a bias.<sup>38</sup> With respect to the MWP for better working conditions, no significant differences can be revealed for East German women soon after the German reunification. With respect to the working schedule, preferences of East German women right after the unification seem to resemble the preferences of all East German women. Hence, these results give rise to think that presorting into family friendly jobs might not affect mothers' MWP. Due to the small sample size, however, we might not conclude statistically significant results.

Besides differences in career aspirations, there also might be diversity among women with respect to their family plans. First, the decision to become a mother might be triggered by the individual job situation. Due to an unsatisfying job situation women might, for instance, want to take a break from work and anticipate their family plans. In this case our sample would over-represent women in worse job conditions who stay longer on leave. Consequently, the estimated amenity coefficients would be upward biased. Previous studies (Lauer and Mühlenweg, 2003; Bratti, et al. 2004), however, do not find any selection into

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<sup>37</sup> In the former GDR occupational choice was severely restricted. Occupational sorting was highly controlled by a so-called "Process of the supply of the young workforce". In a first step, the school was coordinating the demand and the supply of labor, in other words it had to accommodate the needs of the economy with the available students. In a second step, the Office of Labor had to agree to each work contract carried out between a worker and a firm. Additionally, political orientation and social origin were strongly determining if someone could realize their personal occupational plans. In other words, the right of free occupational choice was severely restricted, if not even non existing in the former GDR. For more details about the occupational selection process, please refer to Zimmermann (2002).

<sup>38</sup> A further reduction of the sample is not possible due to a small sample size. Due to high unemployment in East Germany, women, however, did not frequently change their job in the years following reunification. The results of the estimation are available upon request.

motherhood due to job features when estimating the decision about fertility and LFP simultaneously. Second, so far we neglected a further option women have besides staying at home or returning to work, namely getting another child. Yet, the main sample includes all leave spells, following first, second and further births. In case the birth of a further baby lies within the maternity leave period following the birth of a previous baby, this spell is treated as a censored spell. In order to take into account the possibility of consecutive childbirths, I use a restricted sample including only spells after first childbirth and analyze mothers' decision between staying on leave, returning to work or having another baby. For this purpose, I estimate a competing risk model that represents the choice of mothers between these three alternatives during the 36 months after the first childbirth.<sup>39</sup> First-time mothers demonstrate a similar MWP to reduce hazards (30% for a decrease of one standard deviation), and to be able to work during the evening (50%) or in rotating shifts (45%).

One last unobserved dimension, in which mothers might vary, is ability. First, one might think that employers are willing to offer more productive women both a higher wage and more amenities. Second, more capable women might also be more likely to return to work early. If ability is correlated with both better working conditions and a tendency to work, the coefficients estimated in the main specification may be overestimated. Considering, however, the nature of disamenities, such as dust, dirt, extreme temperatures, noise and certain health risks, it is difficult for an employer to treat more productive women differently with respect to the level of these disamenities. Moreover, the wage, measured on the individual level, should be a function of education, experience, ability, and so forth, and thus should incorporate individual ability; i.e., the potential problem of endogeneity should be ruled out.<sup>40</sup>

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<sup>39</sup> Estimation results of the competing risk model are available upon request.

<sup>40</sup> In the context of hedonic wage regressions, where the wage is the dependent variable, unobserved ability constitutes a more severe problem. Nevertheless, I pursue a further robustness check and use "permanent" wages (an average of the wage during all years previous to childbirth) instead of the individual wage prior to childbirth, as those are less prone to measurement errors. Second, I use average occupational wages which are less likely to be correlated with ability. The results barely alter and are available upon request.

Before concluding, I want to address the above mentioned issue of attrition. So far I implicitly assume that “missing” women (3% per month on average) behave as the women continuously observed in the dataset. This is a strong assumption, since we cannot be sure that attrition is a random event. One way to check the robustness of the main specification is to estimate the model using samples extended under extreme assumptions: the “missing” women might start working as soon as they drop out of the sample, or they might never return to their job during the maternity leave period of 36 months. Under both extreme assumptions the results are robust.<sup>41</sup>

To summarize, additional specifications confirm that the less hazardous the guaranteed job and the more flexible the working schedule, the shorter the maternity leave. The following section concludes and provides recommendations for a policy designed to allow mothers to better reconcile work and family.

## 6. Conclusion

This study is, to my knowledge, the first to directly estimate mothers’ MWP for job-related amenities. Its identification strategy relies on statutory maternity leave, exploiting the idea that maternity leave is expected to be shorter the higher the wage and the better the non-wage aspects of the job a mother is guaranteed while being on leave. The focus of this study lies on Germany, where mothers are entitled with the most generous maternity leave (36 months). Using data from the German Socio-Economic Panel and the Qualification and Career Survey, I first estimate the impact of wages and amenities on the choice of maternity leave length by a discrete duration method that assumes a logistic hazard function and lognormal heterogeneity. I can then derive the MWP for amenities by taking the ratio of the elasticity of the hazard rate with respect to a specific amenity over the elasticity with respect to the wage.

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<sup>41</sup> Estimation results using the two, under extreme assumptions, extended samples are available upon request.

The suggested framework of this study contributes to the existing methodologies to measure the MWP. In contrast to previous studies (Gronberg and Reed, 1994 and Bonhomme and Jolivet, forthcoming), which look at job tenure of male workers and hence, fall short in observing all job offers made to the workers, the current approach allows me to overcome the limitations of modeling an explicit wage/disamenity offer process. In the case of maternity leave, all relevant alternatives available to mothers while being on leave are observable: staying at home or returning to the guaranteed job at some point during the 36 month period. The job guarantee, implied by the maternity leave, is thus the key component of my strategy to estimate mothers' MWP.

This study provides furthermore knowledge about the relevance of different job aspects for mothers' labor force participation decision. Understanding mothers' preferences for certain job characteristics might show us how to pave the way back into the labor force for mothers. Given that mothers represent an enormous unused work potential (47% of young mothers are not working in the OECD), an efficient family policy design could alleviate problems arising due to the ageing of society, which is a trend faced by many industrialized countries.

The results of this study show that not only wages but also other non-wage aspects are important determinants of mothers work decision and reveal the following concrete information about mothers' preference for job-related amenities. Hazards, such as health risks, are highly avoided by mothers: they are willing to sacrifice 19.9% of their wage to improve their working conditions by one standard deviation. Distinguishing in the analysis between mothers' financial and educational background reveals that mainly high-income and high-educated women as well as women with a high-educated partner, are willing to cut wages in favor of safer workplaces. In other words, only mothers who can either afford to choose their job according to personal preference or who are aware of potential consequences of menial jobs display a significant MWP to avoid job-related hazards. The working schedule

is pivotal for mothers when deciding how long to stay at home after childbirth. A non-standard schedule seems to be attractive for recent mothers; they are willing to accept severe wage cuts to be able to work during the evening (44.2%) or in rotating shifts (54.7%). Examining differences between East and West Germany demonstrates that only West German mothers exchange wages for this type of working schedule. This result suggests that the source of the high MWP for an unorthodox working schedule lies in institutional differences: the lack of child care facilities in West Germany might trigger a higher MWP to work according to this unusual schedule.

Last, the findings of this study allow me to attach a monetary value to every job characteristic and, hence, to establish a ranking of occupations according to the price mothers would be willing to pay to enjoy the involved amenities. In other words, this ranking provides us with some intuition about the most family-friendly jobs. In terms of the flexible working schedule, occupations like retail, specialized nursing or air controlling, offer the most adequate schedules for mothers. With respect to the working conditions, working in retail seems again to be the most adequate job for a young mother. Likewise, hotel clerks and lawyers, for instance, enjoy a very pleasant working atmosphere. Taking the payment into consideration as well, occupations such as editors, gynecologists or high school teachers seem to be the professions that pay the most, in both monetary and non-monetary terms.

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## TABLES AND FIGURES

Table 1: Summary statistics of occupational characteristics

VARIABLE	Obs.	Mean	Std. Dev	Min	Max
<b>Ln real gross wage</b>	1404	2.3091	0.4922	0.0182	3.6162
<b>Hazards</b>	1404	10.5600	11.1743	0	100
<b>Workload</b>	1404	39.8958	14.2908	0	95
<b>Working hours</b>	1404	35.1045	11.2334	0	70
<b>Work in the evening</b>	1404	0.2058	0.4045	0	1
<b>Night work</b>	1404	0.0897	0.2859	0	1
<b>Shift work</b>	1404	0.1396	0.3467	0	1

**Note:** The sample consists of women who are eligible for maternity leave. It contains 28587 observations.

Table 2a: Occupations ranked in a descending order according to their level of disamenities

Rank	Hazards	Workload
<b>1</b>	plastic worker (100)	plastic worker (100)
<b>2</b>	agronomist (65)	glass producer (80)
<b>3</b>	chemistry lab worker(65)	agronomist (75)
<b>4</b>	glass producer (60)	industrial engineer (70)
<b>5</b>	industrial engineer (60)	animal breeder (68)
<b>6</b>	chemistry worker (57)	nurse (operations) (68)
<b>7</b>	ceramicist (55)	elderly care (67)
<b>8</b>	motorcar engineer (53)	horse breeder (65)
<b>9</b>	warehouse worker (52)	painter/lacquer (65)
<b>10</b>	carpenter (51)	car lacquer (65)

**Note:** I rank the occupation in which the women of the sample (women who are eligible for maternity leave) are working in, in a descending order according to their level of disamenities. The job on place 1, the plastic industry, exposes its workers to the highest amount of environmental hazards, while an agronomist is exposed to the second highest amount, etc. In total there are 100 ranks available. The average level of hazards and workload is shown in parenthesis.

Table 2b: Level of hazards and workload involved in most common occupations of mothers

	<b>Ln(wage) Hazards</b>		<b>Work-load</b>	<b>Working Hours</b>	<b>Evening work</b>	<b>Night work</b>	<b>Shift work</b>
<b>Nurse</b>	2.45	10.61	64.04	33.94	0.52	0.46	0.55
<b>Bank clerk</b>	2.69	2.19	29.11	37.17	0.19	0.00	0.00
<b>Sales person</b>	2.12	6.97	48.94	30.82	0.10	0.00	0.12
<b>Medical secretary</b>	2.25	6.10	43.09	33.25	0.10	0.03	0.20
<b>Secretary</b>	2.41	2.17	23.42	36.46	0.12	0.03	0.06
<b>Educator</b>	2.31	16.67	53.17	37.38	0.41	0.12	0.18
<b>Retail clerk</b>	1.89	6.62	44.29	38.47	0.27	0.03	0.15
<b>Hairdresser</b>	1.57	11.55	43.37	35.56	0.00	0.00	0.09
<b>Office clerk</b>	2.03	2.15	23.14	37.02	0.03	0.00	0.03
<b>Dental assistant</b>	2.12	12.76	41.67	33.44	0.06	0.00	0.13

Table 3: Descriptive Statistics of the personal and occupational characteristics

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Age</b>	1404	30.8697	4.5734	18	46
<b>Partner (in %)</b>	1404	0.9330	0.2500	0	1
<b>Education (in years)</b>	1404	12.0007	3.1835	1	18
<b>West (in %)</b>	1404	0.8027	0.3981	0	1
<b>East (in %)</b>	1404	0.1880	0.3909	0	1
<b>Other income sources</b>	1404	32449	17413	0	219528
<b>Low income</b>	1404	0.2457	0.4307	0	1
<b>Intermediate income</b>	1404	0.3618	0.4807	0	1
<b>High income</b>	1404	0.3832	0.4863	0	1
<b>Technology (in %)</b>	1404	0.0548	0.2278	0	1
<b>Service (in %)</b>	1404	0.6218	0.4851	0	1
<b>Manufacturing (in %)</b>	1404	0.1510	0.3582	0	1
<b>Agriculture (in %)</b>	1404	0.0071	0.0841	0	1
<b>Public admin. (in %)</b>	1404	0.0776	0.2677	0	1
<b>Educational sector (%)</b>	1404	0.0719	0.2585	0	1

Table 4: Duration of the maternity leave – Kaplan-Meier survival estimates

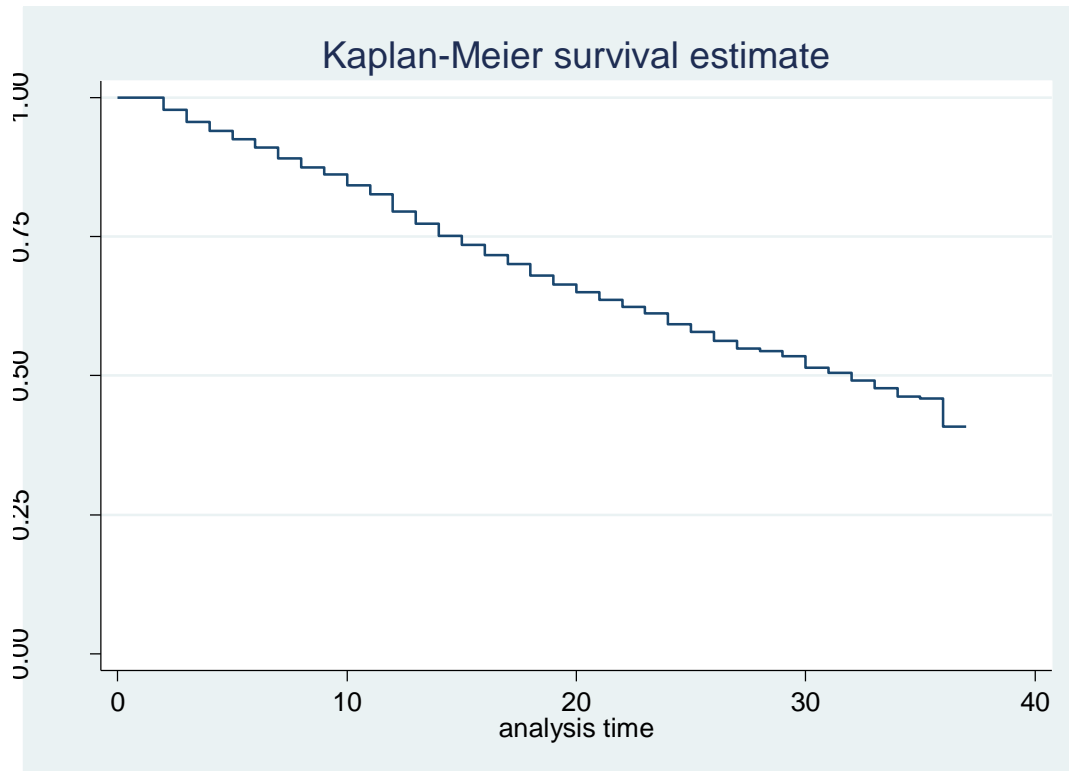


Table 5: Binary relation between the disamenities and the total leave length

Leave in months	<6	7-12	13-24	25-36
<b>Spells</b>	197	245	450	512
<b>Frequency in %</b>	0.14	0.17	0.32	0.36
<b>Ln real gross wage</b>	2.3840	2.3789	2.3041	2.2513
<b>Hazards</b>	9.3313	9.2750	11.1495	11.1295
<b>Workload</b>	38.2271	39.6250	40.5249	40.1145
<b>Working hours(+overtime)</b>	35.7086	34.4367	35.3400	34.9775
<b>Work in the evening</b>	0.2234	0.2571	0.2467	0.1387
<b>Night work</b>	0.1015	0.1102	0.1089	0.0586
<b>Shift work</b>	0.0863	0.2122	0.1511	0.1152

**Note:** The table above shows raw data: for four different leave lengths windows (0-6 months; 7-12 months, 13-24 months and 25-36 months) the mean of job characteristics of the guaranteed job are displayed.

Table 6: Results for the coefficients of the job characteristics

	Working <sup>1</sup>	Working <sup>2</sup>	Working <sup>3</sup>	Working <sup>4</sup>	Working <sup>5</sup>
	1	2	3	4	5
<b>Ln gross wage</b>	0.481*** (0.0981) [0.0109]	0.554*** (0.122) [0.0119]	0.681*** (0.145) [0.0118]	0.705*** (0.147) [0.0126]	0.683*** (0.146) [0.0123]
<b>Hazards</b>	-0.016*** (0.00518) [-0.0004]	-0.014*** (0.00522) [-0.0003]	-0.0135** (0.00655) [-0.0002]	-0.0136** (0.00665) [-0.0002]	-0.0134** (0.00656) [-0.0002]
<b>Workload</b>	0.00375 (0.00380) [0.0001]	0.00424 (0.00386) [0.0001]	0.00367 (0.00492) [-0.0001]	0.00349 (0.00500) [-0.0001]	0.00361 (0.00494) [-0.0001]
<b>Working hours</b>	-0.00260 (0.00363) [-0.0001]	-0.00609 (0.00380) [-0.0001]	-0.00613 (0.00446) [-0.0001]	-0.00611 (0.00453) [-0.0001]	-0.00594 (0.00448) [-0.0001]
<b>Work evenings</b>	0.261** (0.126) [0.0064]	0.242* (0.128) [0.0056]	0.301* (0.154) [0.0058]	0.314** (0.157) [0.0062]	0.304** (0.155) [0.0061]
<b>Night work</b>	0.0352 (0.172) [0.0008]	-0.111 (0.176) [-0.0023]	-0.204 (0.208) [-0.0033]	-0.211 (0.211) [-0.0034]	-0.209 (0.208) [-0.0035]
<b>Shift work</b>	0.306** (0.129) [0.0077]	0.313** (0.132) [0.0076]	0.372** (0.157) [0.0074]	0.370** (0.160) [0.0076]	0.367** (0.158) [0.0076]
<b>Rho</b>	0.06044** (0.02557)	0.06415** (0.028385)	0.19266** (0.039845)	0.2080*** (0.039769)	0.1970*** (0.040834)
<b>Constant</b>	-4.854*** (0.318)	-5.858*** (1.602)	-6.057*** (2.036)	-6.483*** (1.941)	-6.200*** (1.916)
<b>Observations</b>	28587	28587	28587	28587	28587

**Note:** The coefficients are from a discrete logistic duration estimation with frailty (log-normal distributed individual permanent residual). Standard errors are in parentheses: \*significant at 10%; \*\* significant at 5%, \*\*\* significant at 1% . Marginal effects are displayed in brackets. Note furthermore, rho is the coefficient of the individual time-invariant error term.

<sup>1</sup> Model 1: no further controls are included

<sup>2</sup> Model 2: Additional controls: partner, age, age squared, education, further births, region & income

<sup>3</sup> Model 3: Additional controls, besides the ones in model 2 are average occupational wage growth as well as sector, month and year dummies

<sup>4</sup> Model 4: I use log(t) for the baseline hazard

<sup>5</sup> Model 5: I include t, t squared and t cubic for the baseline hazard

Table 7: Marginal willingness to pay for amenities associated with work

	<b>MWP</b>	<b>Standard Errors</b>
<b>Hazards</b>	-0.0199**	0.0105
<b>Workload</b>	0.0054	0.0073
<b>Working hours</b>	-0.009	0.0067
<b>Work evenings</b>	0.4418*	0.2505
<b>Night work</b>	-0.2993	0.3095
<b>Shift work</b>	0.5468**	0.2563
<b>Note:</b> The above displayed coefficients for the MWP for certain amenities are calculated according to equation (8) using the estimated coefficients shown in column 3 of Table 6.		

Table 8a: MWP to avoid hazards for mothers from different income and education groups

	MWP to avoid hazards for different income groups <sup>1</sup>	MWP to avoid hazards for different education groups <sup>2</sup>	MWP to avoid hazards according to partners' education <sup>2</sup>
<b>Low group</b>	-0.0181 (0.0139)	0.0253 (0.0328)	-0.0135 (0.0216)
<b>Intermed. group</b>	-0.0199 (0.0165)	-0.0265** (0.0132)	-0.0190** (0.0129)
<b>High group</b>	-0.0246 (0.0167)	-0.0772** (0.0403)	-0.0595** (0.0326)

**Note:** Using the results of a discrete logistic duration estimation with lognormal frailty including interaction terms between the job characteristics and the income group or the education respectively, I can calculate the displayed MWP for certain amenities according to equation (8). Standard errors are shown in parenthesis below. The results of the discrete duration model are available upon request. The income groups are created according to the income thresholds of the maternal benefit payment described in Section 3. The educational levels correspond to the three school tracks offer in Germany; a lower one leading to a vocational training, an intermediate one, and a higher one allowing for university access.

Table 8b: MWP for the working schedule distinguishing between East and West Germany

	MWP for West Germany	MWP for East Germany
<b>Working hours</b>	-0.0129** (0.0064)	0.0334 (0.0225)
<b>Evening Work</b>	0.5373** (0.2469)	-0.5589 (0.5307)
<b>Shift Work</b>	0.5433** (0.2528)	0.4529 (0.5197)

**Note:** Using the results of a discrete logistic duration estimation with lognormal frailty including interaction terms between the region and the job characteristics, I can calculate the displayed MWP for certain amenities according to equation (8). Standard errors are shown in parenthesis below. The results of the discrete duration model are available upon request.

Table 9a: Comparison of job characteristics previous and posterior to maternity leave

	<b>Job characteristics previous to leave</b>	<b>Job characteristics posterior to leave</b>
<b>Ln real gross wage</b>	2.4278	2.3708
<b>Hazards</b>	8.8015	9.3647
<b>Workload</b>	39.7026	39.7704
<b>Working hours</b>	35.7102	27.2039
<b>Work in the evening</b>	0.2602	0.2504
<b>Night work</b>	0.1138	0.1008
<b>Shift work</b>	0.1396	0.1463

**Note:** Column 1 shows the characteristics reported by a woman before going on leave and column 2 the ones reported by a mother conditional on having come back to work. The sample sizes is thus restricted to the women who are returning to work and whose job characteristics are observed both previous and posterior to maternity leave.

Table 9b: MWP for disamenities in the different years of maternity leave

	MWP for year 1	MWP for year 2	MWP for year 3
<b>Hazards</b>	-0.0217 (0.0103)	-0.0219 (0.0104)	-0.0238 (0.0125)
<b>Work evenings</b>	0.3490 (0.2290)	0.3522 (0.2306)	0.3827 (0.2648)
<b>Rotating shifts</b>	0.5401 (0.2464)	0.5451 (0.2487)	0.5923 (0.3004)

Note: The table above is based on the results of a discrete duration estimation with lognormal frailty including interaction terms of the wage with dummies for each of the three years of maternity leave. Using equation (8) I can calculate the MWP for each amenity but depending on the year after giving birth. Standard errors are shown below in parenthesis. The results of the discrete duration model are available upon request.